

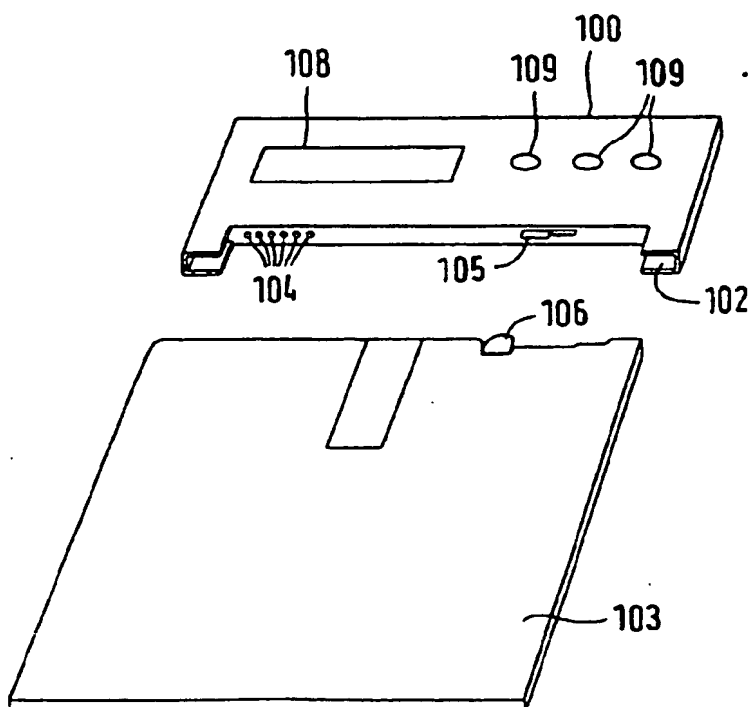
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: G06K 19/077, 7/08	A1	(11) International Publication Number: WO 97/07481 (43) International Publication Date: 27 February 1997 (27.02.97)
(21) International Application Number: PCT/EP95/03745 (22) International Filing Date: 22 September 1995 (22.09.95) (30) Priority Data: 08/514,382 11 August 1995 (11.08.95) US (71) Applicant: SMARTDISKETTE GMBH [DE/DE]; Ferdinand-Abt-Strasse 1, D-65510 Idstein (DE). (72) Inventors: BARRETT, Paul; Mayfield, Old Malden Lane, Worcester Park, Surrey KT4 7PU (GB). EISELE, Raymund; Ferdinand-Abt-Strasse 1, D-65510 Idstein (DE). (74) Agent: LEINWEBER, Jürgen; Aggerstrasse 24, D-50859 Köln (DE).		(81) Designated States: AU, CA, JP, NO, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

(54) Title: POCKET INTERFACE UNIT (PIU) FOR A SMART DISKETTE**(57) Abstract**

A pocket interface unit for a smart diskette. The smart diskette has a housing of the shape and size of a standard diskette, electrical contacts and/or a magnetic transducer, an activation switch, and further has an interface, a processor and memory disposed in the housing and operatively coupled to the electrical contacts/magnetic transducer. The interface unit includes a frame adapted to removably attach to the smart diskette housing, electrical contacts and/or magnetic transducer for engaging corresponding electrical contacts and/or magnetic transducer on the smart diskette, a switch operating mechanism for operating an activation switch on the smart diskette when the smart diskette is attached to the frame, a display operatively coupled to the electrical contacts and/or magnetic transducer, for displaying text and/or graphical data under control of the smart diskette, and a plurality of user actuatable keys, operatively coupled to the electrical contacts and/or magnetic transducer, for facilitating user input of data under the control of the smart diskette. The pocket interface unit thereby provides a user interface with the smart diskette.



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Pocket Interface Unit (PIU) for a smart diskette

BACKGROUND OF THE INVENTION1. Field of The Invention

10 The present invention relates generally to the field of computer user interfaces, and in particular to a pocket user interface (PIU) device which is adapted to accommodate and/or interface with a smart diskette.

2. Background Information

15 A smart diskette is a device having the external shape of, for example, a standard 3½" diskette, and which contains therein, instead of and/or in addition to a magnetic medium, interface and processing circuitry for providing particular functionality to the device.

20 The smart diskette circuitry includes an interface for transferring data between other components on the device and a magnetic head of a standard disk drive. In various forms, the smart-diskette device also includes a microprocessor for controlling the device and performing various tasks, such as

data encryption, and memory, in the form of RAM (random access memory), ROM (read only memory), EEPROM (electronically erasable/programmable read only memory), and/or Flash memory devices, for storing programs and data.

5 U.S. Patent No. 5,159,182, and copending application S.N. 08/420,796 (Atty Docket No. LWBR 0006C1), disclose a smart-diskette insertable element with magnetic interface, processor, power supply and optional display and keypad to be inserted into a standard 3½" floppy disk drive, for example,
10 of a host computer, i.e., electronic data processing (EDP) equipment, such as a desk-top personal computer (PC) or notebook computer.

An exemplary embodiment of the smart-diskette insertable element disclosed in the above-mentioned patent and
15 application, has a processor with a built-in memory and an interface designed in such a way that it is possible to exchange data between the element's processor and the EDP equipment's disk drive read/write head. A driver converts signals coming from the element's processor into the required magnetic form at the interface, and converts signals coming
20 from the external EDP equipment through the interface into the required form for the processor.

A significant advantage of this smart diskette insertable element is that, by virtue of its insertability
25 into a standard disk drive and interfaceability therewith, it

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is possible to carry-out operations with the element's processor, such as encryption and decryption of data or verification of user identity, without requiring a special interface or plug-in board which might be suitable only for a particular computer system.

Another advantageous feature of the smart diskette insertable element is its ability to store additional data and/or programs in on-board memory connected with the element's processor. This considerably increases the potential areas of application for the element.

The smart diskette element disclosed in the above patent and application, may also be equipped with a battery power source supplying power to other electronic components within the element.

The interface of the smart diskette insertable element is designed to allow data to be relayed through it, between the element's processor and the read/write head of the disk drive. One way of achieving this is to place an electromagnetic component, e.g., one or more coils, in the vicinity of the interface which is able to generate magnetic field information equivalent to that generated by the magnetic disk of a standard, e.g., floppy, diskette. In this way the interface is therefore able to simulate the magnetic disk. This property of the interface allows data to be transferred from the element's processor to the

EDP-equipment, e.g., data which enables user identification to be verified, thereby providing security to the EDP equipment. The interface is receives signals coming from the EDP-equipment via the disk drive write head and passes these
5 on to the element's processor. This exchange of data makes a variety of operations possible, as would be recognized by one skilled in the art.

The smart-diskette disclosed in the above patent and application may also be provided with an alpha-numerical
10 display and/or keypad. The keypad and/or display may be in the form of a separate module attached physically and electrically to the smart diskette element so that it is visible even when the smart-diskette is inserted in the disk drive of a computer terminal.

15 As processor capabilities expand and memory devices with increasing capacity become smaller, the smart diskette takes on the potential for more and more useful applications.

Copending application S.N. 08/211,488 (Atty Docket No. LWBR 0019) discloses a read/write unit with a read/write head
20 and optional electrical contacts, but without the standard disk driving and head moving parts, for use in a desk-top PC or notebook computer to communicate with a smart diskette. By eliminating the drive motor and moving read/write heads, energy otherwise expended by the use of such moving parts is
25 avoided.

Further, such a read/write unit, since it eliminates bulky drive and head motors, can be made more compact than a standard disk drive, thereby reducing the overall size requirements for the computer in which it is installed.

5 Such a read/write unit in conjunction with a smart diskette operating as a security device can also provide protection from unauthorized use of the computer in which it is installed. Protection against access to the computer, and consequently, any network to which it is attached, is
10 achieved with the aid of the smart diskette which contains corresponding authorization codes and the like, but which can also be used with standard commercially available, e.g., 3½" drives.

15 Since a normal diskette cannot operate with the read/write unit, an unauthorized user cannot exchange data with the read/write unit. The optional electrical contacts can be used to power the smart diskette components from the computer device in which the read/write unit is installed, and/or to provide another path for data exchange.

20 Possible applications and advantages of such a read/write unit include providing convenient add-on memory without the need of a special interface, such as PCMCIA. In this regard, the read/write unit operates with a smart diskette having on-board memory of several megabytes, for
25 example.

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The read/write unit is particularly useful with notebook and notepad type computers, where energy conservation and weight are very important, since the read/write unit does not have bulky energy consuming moving parts.

5 This read/write unit can be used with conventional EDP devices as well, e.g., desk-top personal computers, to provide additional security, functioning as a 3½" drive which can be used only with smart diskettes, and not with conventional diskettes.

10 Simple data exchanges between conventional 3½" drives and notebooks/notepads equipped with the energy conserving read/write unit are facilitated using smart diskettes. In addition, higher data flow rates than with conventional floppy drive units, e.g., up to several Mbit/sec, are
15 achievable with this read/write unit.

 Pocket calculators and diary devices are known and gaining acceptance with busy executives, for example. However, such devices have numerous limitations and disadvantages. For example, although such devices can
20 interface with a desk-top computer to download application programs and/or data, for example, or to upload data entered on the pocket device to the desk-top computer, to do so currently requires inconvenient cabling, and/or a special interface unit, e.g., PCMCIA, with associated costs.

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In addition, such pocket devices are generally limited to a single special application, such as a phone directory, or a golf-handicap calculator, and do not provide the range of capabilities of a notebook computer, for example.

5 Although some pocket devices are "programmable," this is often achieved only through the insertion and removal of a limited set of specially made ROM integrated circuit modules available from the manufacturer of the pocket device.

10 Pocket-sized pagers and cellular telephones are also known. However, these respective devices do not generally have the capability of functioning as anything except a pager or telephone, that is, they are generally devices which are dedicated to a single function.

15 Therefore, the fully-equipped, fully-functional executive may be burdened by having to carry around a variety of separate devices, which further disadvantageously cannot readily interface with one another.

SUMMARY OF THE INVENTION

20 The present invention pocket interface unit (PIU), in conjunction with a smart diskette having ever increasing capabilities, solves the above-mentioned problems and disadvantages of the current portable devices, and provides new and useful applications for the smart diskette.

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The PIU is a small portable device which provides a smart diskette with various user interfaces. For example, the PIU can provide the smart diskette with a display, buttons, a keypad or keyboard, a mousepad or trackball, etc.

5 The PIU can further provide peripheral interfaces, for example, infrared (IR) communications for a printer, mobile (cellular) telephone and/or wired telephone, short range electro-magnetic receiver for heart-rate monitor, cyclometer, etc.

10 The PIU can itself provide peripheral functions, such as a modem, a mobile (cellular) telephone (data and/or voice), loudspeaker, microphone, etc.

15 One advantageous aspect of the PIU device is that it is configured as a portable pocket-sized device, and allows a smart diskette, which has had data and programs downloaded from a PC via the standard 3½" floppy diskette drive, for example, to be used for various applications away from the PC.

20 A further advantage is that, subsequent to use away from a PC, any new data entered or data modified in the smart diskette via the PIU can be uploaded into almost any PC and used, e.g., stored, processed, communicated, etc., by a PC application program.

25 Advantageously, the PIU device incorporates electrical contacts and/or a read/write unit without energy consuming

moving parts, e.g., disk drive motor and/or head moving motor, providing a way to store data entered remotely, while on an airliner, for example, to a smart diskette, the data being later transferred to a portable or desk-top PC from the smart diskette.

By providing a portable device which incorporates a variety of peripheral functions, the need of an executive to carry multiple devices to be fully-equipped is substantially reduced or eliminated.

Flexibility is enhanced with the PIU and smart diskette combination which advantageously provides a number of pocket size electronic devices, e.g., computers, organizers, games, fitness/sports performance monitors, pagers, etc.

Advantageous connectivity through a simple interconnection via a standard 3½" floppy diskette drive to almost any PC is achieved with the PIU according to the present invention.

Advantageous portability is provided by the design in which the PIU with smart diskette can fit into a coat or shirt pocket to be carried and used practically anywhere.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and advantages of the invention will become apparent from the following detailed description taken with the drawings in which:

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Fig. 1 shows a first embodiment of a PIU according to the invention, a "mini" PIU, having a slot for physical attachment to a smart diskette, electrical contacts to exchange data with the smart diskette, a mechanism to operate a switch on the smart diskette switch and a battery;

Fig. 2 shows a second embodiment of a PIU of approximate dimensions $3\frac{1}{2}" \times 3\frac{1}{2}" \times .5"$ with a slot for physical attachment to a smart diskette, electrical contacts and/or a magnetic transducer to exchange data with the smart diskette, a mechanism to operate a switch on the smart diskette and a battery;

Fig. 3 shows another embodiment of a PIU having similar dimensions and features as the embodiment of Fig. 2, but having a touch-screen or write-on display plus a few buttons replacing the keypad as the means of user input;

Fig. 4 shows another embodiment of a PIU having the approximate dimensions of $6" \times 5" \times .75"$ and having a slot for physical attachment to a smart diskette, electrical contacts to exchange data with the smart diskette, a mechanism to operate a smart diskette switch and a battery;

Fig. 5 shows an exemplary embodiment of a smart diskette;

Fig. 6 shows a read/write device having no drive or head motors for use with a smart diskette;

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Fig. 7a shows a smart diskette adapted to receive an IC smart-card;

Fig. 7b shows a cross-section of the smart diskette of Fig. 7a; and

5 Fig. 7c shows an IC smart-card for insertion in the smart diskette of Fig.s 7a and 7b.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention will now be described in more detail by example with reference to the embodiments shown in the
10 Figures. It should be kept in mind that the following described embodiments are only presented by way of example and should not be construed as limiting the inventive concept to any particular physical configuration.

The "mini" PIU 100 according to a first embodiment of
15 the invention, illustrated in Fig. 1, has, for example, a slot 102 for physical attachment to a smart diskette 103, electrical contacts 104 to exchange data with and/or provide power to the smart diskette 103, a mechanism 105 to operate a switch 106 on the smart diskette 103 switch, and an optional
20 battery (not shown). The switch 106 powers the smart diskette 103 when it is inserted into a drive or PIU device. The slot 102 may include detentes therein which fit into corresponding recesses in the smart diskette 103, for

example, or other such conventional securing means, for removably securing the smart diskette 103 to the PIU 100.

The optional battery (not shown) could be accessed from the underside, i.e., the side opposite the display, through a conventional access panel, for example. The smart diskette 103 itself may contain an internal battery (not shown) as well.

Besides processor, memory and interface circuitry, the smart diskette 103 may also include a real-time clock, and special purpose modules, such as for implementing a cellular telephone, pager, heart-rate monitor, etc. Operating system firmware would be provided on the smart diskette 103, and application program instruction could either be provided in firmware, be down-loadable into RAM memory, or a combination of both. Fig. 5, which will be described below, shows an exemplary smart diskette in more detail.

With the illustrated optional display 108 and buttons 109 a user can read displayed text or graphical data transferred from the smart diskette 103 and, for example, enter selections from a menu presented on the display 108 by actuation of an associated button 109. One of the buttons 109 could advantageously be a manual override power switch to override the switch 106 and de-power the smart diskette 103.

The currently widespread liquid crystal display (LCD) technology provides an effective energy efficient display for

use with the PIU 100. Although not illustrated, the PIU display 108 would incorporate conventional circuitry for driving the display 108 based on data transferred from the smart diskette 103. Alternatively, such display driving circuitry could be incorporated into the display 108 itself, or provided on the smart diskette 103, if practical.

The buttons 109 can be configured as mechanical switches, for example, of various conventional types. Conventional circuitry for detecting/decoding the actuation of a button 109 could be provided on the PIU 100 or alternately the smart diskette 103, as with the display driving circuitry.

Optional further interfaces (not shown) to peripheral devices may be provided on the mini PIU 100, e.g., to a heart-rate monitor or cyclometer, as would be readily apparent to one skilled in the art. These further interfaces may be, for example, infra-red, wired, or wireless links.

For example, a heartbeat detector would transmit pulses of data corresponding to a user's heartbeat via a wireless link to the mini PIU 100 and hence into the smart diskette 103. The smart diskette 103 would store a continuous count of incoming heartbeats and use an on-board real-time clock (not shown) to calculate heart-rate at pre-programmed timing intervals. The user would subsequently insert the smart diskette 103 into a PC's standard 3½" floppy disk drive and

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run an application program on the PC which would display the recorded heart-rate data and, for example, show comparisons with previous measurements. Further, with the optional display 108 and buttons 109, a user can have an
5 immediate/continuous read-out of his/her heart rate on the PIU 100.

A PIU 200 according to the second embodiment of the invention is illustrated in Fig. 2. The PIU 200 according to this exemplary embodiment would have the approximate
10 dimensions of $3\frac{1}{2}$ " x $3\frac{1}{2}$ " x .5", for example, and includes slot 202 for physical attachment to a smart diskette 103. Either electrical contacts (104) as in the first embodiment (Fig. 1) and/or a magnetic transducer as in the read/write unit according to related copending application S.N. 08/211,488,
15 is provided in the PIU 200 to exchange data with the smart diskette 103. Also provided on PIU 200, but not shown, is a mechanism to operate smart diskette switch 106, and an optional battery, as in the first embodiment of Fig. 1. An exemplary read/write unit is illustrated in Fig. 6, and will
20 be described in more detail below.

Further the illustrated PIU 200 incorporates a keypad 204 provided with, for example, alpha-numerical 206, function 207, and cursor control 208 keys, a display 209,
open/closeably connected to the PIU 200 by a hinge 210, for
25 displaying data and/or graphics, with optional touch-screen

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functions provided through appropriate design and programming, and a piezo-electric beeper, for example (not shown). As with the first embodiment, conventional circuitry for driving the display, keyboard and beeper could be provided on the PIU 200, or alternatively, the smart diskette 103.

Further optional features envisioned could include a conventional transducer or transducers 212, and circuitry (not shown) to operate the PIU 200 as a cellular telephone and/or pager. As with the first embodiment 100, optional interfaces (not shown) to peripheral devices may be provided for on the PIU 200, as would be readily apparent to one skilled in the art.

The second embodiment PIU 200 could be used as follows, for example. A user would insert a smart diskette 103 into a standard 3½" floppy diskette drive of a PC and download, for example, a diary program and data from a PC application into the memory of the smart diskette 103. The smart diskette 103 would then be removed from the PC and inserted into the PIU 200 according to the second embodiment, which may be carried around easily and transported anywhere in the user's coat or shirt pocket. The PIU 200 can then be used to display on display 209 the diary, and update it via the keypad 204 or touch-screen 209 no matter where the user is located, for example, on an airliner or train, or in a restroom. The

optional real-time clock inside the smart diskette 103 can produce an audible signal through the PIU piezo-electric beeper (not shown) to warn the user of appointments, etc. thereby functioning as an alarm clock.

5 The next exemplary embodiment illustrated in Fig. 3 is a PIU 300 with similar dimensions, i.e., sized to fit easily in a coat or shirt pocket, and features as the embodiment (200) of Fig. 2. The PIU 300 has a slot 302 for accommodating a smart diskette 103, a touch-screen or write-on display 303,
10 and a few buttons 304, instead of the keypad 204 of the second embodiment (200) for user input. An open/closeable cover 305 to protect the display 303 is connected to the main body of the PIU 300 by hinge 306, for example.

 Further options which could be included in the
15 embodiment of Fig. 3 would be generally the same as for the embodiment (200) of Fig. 2, that is, conventional transducers and circuitry to operate as a cellular telephone and/or pager, optional interfaces to peripheral devices, etc., as would be readily apparent to one skilled in the art.

20 Fig. 4 shows another embodiment of a PIU 400 having, for example, the approximate dimensions of 6" x 5" x .75", with a slot 402 for physical attachment to a smart diskette 103, electrical contacts and/or a magnetic transducer (not shown) as in the previously described embodiments to exchange data
25 with the smart diskette 103, a mechanism (not shown) to

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operate a smart diskette switch 106, and an optional battery.

This exemplary illustrated embodiment has a small-sized computer "qwerty" keyboard 404 and a relatively large display 405 open/closeably attached by hinge 406 to the PIU body.

5 Also illustrated is an exemplary location of an optional microphone 408 and micro-camera 410. Associated conventional electronic circuitry (not illustrated) for these optional devices 408 and 410 would be located either in the PIU 406 or the smart diskette 103.

10 Further options for this exemplary embodiment include those mentioned above for the other embodiments, i.e., a conventional transducer or transducers (212), and circuitry to operate as a cellular telephone and/or pager, optional interfaces to peripheral devices, etc., as would be readily
15 apparent to one skilled in the art.

Fig. 5 illustrates an exemplary smart diskette 103 for use with a PIU according to an embodiment of the present invention. A magnetic transducer 510 is electrically coupled to control/interface block 511 to accomplish data transfers
20 to and from a corresponding read/write head in the PIU. The control/interface block 511 is further coupled to processor block 512. Memory block 513, which represent RAM, ROM, EEPROM, Flash memory, etc., is coupled to the processor block 513. Battery 514 supplies power via regulator 516 to the
25 various components. Alternatively, power may be supplied

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through contacts 515 from the PIU, as previously described. Also, data transfers may be accomplished through contacts 515 if the PIU does not provide a read/write head. Special purpose module block 517 represents the circuitry necessary to implement a special function, e.g., cellular telephone, pager, etc.

Fig. 6 illustrates an exemplary read/write unit 610, provided with contacts 104, a read/write head 620, and a control block 630 which is shown coupled to an external processor 640.

It will be understood that the above description of the present invention is susceptible to various modifications, changes and adaptations, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

For example, the illustrated embodiments are PIU's for use with a 3½" sized smart diskette, however, a PIU which adapts to other sized smart diskettes, e.g., 2", 2-1/4" or 5¼" sized smart diskettes, for example, are considered within the scope of the present invention.

Although the illustrated PIU embodiments accommodate a smart diskette in a slot engagement arrangement, other arrangements are also envisioned. Instead of a slot, the PIU could snap-fit onto a top surface of a smart diskette, for example.

Although the described PIU's optionally include a battery, other appropriate power sources may be provided instead of, or in conjunction therewith, for example, an array of solar cells could be provided on an upper surface of the PIU and/or smart diskette.

Although the smart diskette is described as having a microprocessor and program memory, this could be substituted in whole or in part with hard-wired logic circuitry, programmable logic arrays, or the like, as would be readily apparent to one skilled in the art.

The various transducers optionally provided are envisioned to include built-in microphones and speakers, and/or jacks for external microphones and speakers could be provided. Telephone and modem tone generators may be
5 incorporated into the PIU's, as can be visible and infra-red light producing devices, and the like.

Various additional functionality could of course be provided by the smart diskette itself. For example, the smart diskette itself could include additional interface
10 circuitry for coupling to a communications network, as disclosed in U.S. Patent No. 5,____,____ and related copending application S.N. 08/479,747 (Atty Docket No. LWBR 0013D1), hereby incorporated by reference. The smart diskette could include circuitry for interfacing with any of a variety of
15 peripheral devices, for example, a smart-card (IC) reader.

Alternatively, a smart-card reader could be built into the smart diskette, such as illustrated in Figs. 7a, 7b and 7c, and disclosed in related copending application S.N. 08/____,____ (Atty Docket No. LWBR 0017), hereby incorporated
20 by reference.

Shown in Figs. 7a-c is one example of a smart diskette
103 adapted to include contacts 701 for interfacing with a smart-card 702 and to include a slot 703 having a cut-out 704
for facilitating grasping the card 702, so that the card 702
25 is insertable in slot 703 and contacts 701 connect with

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corresponding contacts 705 on the card 702. The illustrated arrangement of some of the components on the smart diskette has been changed to accomplish this, e.g., battery 514, magnetic interface 511, processor 512, and memory 513. Of course, the location and size of the card receiving slot 703 and the number of contacts 701 would vary depending on the IC smart-card 702 to be accommodated. Recess 700 is disposed on the bottom of the smart diskette 103 where the drive for a magnetic diskette is normally located.

Besides the general security features described above, a wide variety of security related features may be provided by appropriate programming and/or configuring of the smart diskette and/or PIU. For example, a PIU could be provided with a ROM containing a security code which would render it useless with a smart diskette which does not have a corresponding code. Alternatively, the smart diskette could prompt a user for an identification code upon insertion into a PIU, and deny access unless the correct code is entered on the PIU keyboard/keypad.

Besides those applications described above, it is envisioned that the PIU with inserted smart diskette could function to provide an electronic spread-sheet, a perpetual calendar, a telephone directory, a word-processor, entertainment (game) programs, English-foreign language dictionary, financial calculator, stock quote and/or

analysis, or any other of the multitude of applications currently available for desk-top and notebook computers.

Other sorts of devices could be built into the PIU, for example, a scanner for scanning written documents into memory, or a micro-camera (410 in Fig. 4) for providing video image storage and/or transmission over cellular telephone, for example. If disguised as or incorporated into an innocuous household or office item, such as a book or lamp, a PIU equipped with an audio or video input device could be used to provide secret monitoring of an area. A smart diskette could be programmed to periodically record in its memory, for example, once a minute, a snap-shot of audio or video input from such a PIU. Subsequently, the smart diskette would be removed and the snap-shots retrieved into a personal computer by security personnel for analysis.

A PIU with a bar code reader could be used in inventory applications. For example, inventory bar codes would be scanned and/or keyed in, and stored in the memory on the smart diskette. Subsequently, the smart diskette could be removed from the PIU and inserted in an inventory control computer's 3½" disk drive for retrieval and processing.

A PIU equipped with a microphone (408 in Fig. 4) could be used as a dictation device where spoken text is digitized and stored in the smart diskette, or in various applications utilizing speech recognition technology. In the latter case,

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smart diskette 103 would be provided with word/phrase recognition software in memory 513, for example, and/or special purpose module 517 could be a vocoder analyzer, e.g., a programmed digital signal processor for implementing liner predictive coding (LPC). The PIU with smart diskette so configured then could function as a voice response system, i.e., programmed to respond to simple voice commands such as "save" or "run."

Alternately, the PIU with smart diskette configured with microphone 408 and speech recognition software/module could function as a speaker recognition system, i.e., a system which recognizes and/or verifies a particular person (speaker) producing the speech. The verification could be used to obtain access to the PIU functionality.

On the other hand, a PIU equipped with a keypad, display and loud-speaker, for example as in Figs. 2 or 4, could be used as an aid for speech-impaired individuals, where words and/or phrase codes could be keyed in, and spoken text accessed on the smart diskette and output through the loud-speaker. Conventional text to speech circuitry could be provided on the smart diskette in the special purpose module 517, and/or software in memory 513, for such an application.

The PIU keypad could further incorporate a braille keyboard for use by sight-impaired individuals. Foreign

language keyboards could be enabled through software and/or be provided as specific PIU's.

Specific medical information about an individual could be stored on a smart diskette, and medical personnel could access the information in an emergency either through a PIU or a hospital computer's 3½" disk drive. Such a smart diskette could be labelled with the international red cross symbol, or the like, identifying it as containing vital medical information. Such information could be stored in the smart diskette in any or all of the major languages for use when travelling abroad. Emergency contacts, such as family or medical specialists to contact in case of an emergency could be stored therein as well.

In a PIU equipped with a cellular telephone module, a panic button or emergency code could be provided on the PIU which would direct the smart diskette with PIU to automatically call emergency personnel. If also equipped with a heart rate monitor, in case of irregular heart beats, or other abnormal heart activity indicative of a medical emergency, the smart diskette could be programmed to call emergency personnel automatically.

The smart diskette could be loaded with bank transaction software and/or a specially configured PIU provided so that banking activities could be readily accomplished remotely.

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In such an application, security features such as are used conventionally in remote banking would be naturally provided.

A PIU with appropriately programmed smart diskette, could be used as an electronic answer sheet. For example, instead of providing test-takers with pencils and paper answer sheets, each test taker would be given an appropriately programmed smart diskette and PIU. The PIU would be provided with a display and numeric or alpha-numeric keypad. The smart diskette would be programmed to prompt the test taker for his/her unique identification number, such as a social security number or student ID number.

After entering and verifying the ID as being associated with a bonafide student, the smart diskette would prompt the test-taker to open the test booklet and begin the test. The smart diskette with PIU would then display something like "Q1?" and wait for the test-taker to input the number corresponding to his/her answer selection for the first question. When the first answer is entered, the smart diskette would record the answer in its memory and display a prompt for the next question. A built in timer could be provided which would end the test after a pre-programmed time had elapsed.

After the test had been completed, the test-takers would turn-in their smart diskettes and PIU's. To grade the test, the test-giver would simply remove each smart diskette from

its PIU, and insert each smart diskette into the 3½" disk drive of a personal computer programmed to access the test-taker's ID and answers, and determine a raw score.

After loading all the test-takers' data, the personal computer could readily identify questions which should be discarded or discounted because all test takers missed them, for example. The personal computer could calculate mean and median scores, assign grades, etc. With such a device, grading errors due to stray or light pencil marks, for example, associated with paper answer sheets would be eliminated. Additionally, special purpose and expensive test reading devices would be eliminated since the ubiquitous personal computer programmed to access the smart diskettes through its 3½" disk drive would be used.

From the above examples it should be apparent that the variety of uses for the present invention are limited only by the imagination of the application programmer. As memory with greater and greater capacity becomes available, the data and program storage capacity of the smart diskette expands accordingly. Likewise, as microprocessors with greater capabilities are developed, so to the capabilities of the smart diskette expand.

As display technology advances, so too does the display capability of the PIU display. The present display technology, e.g., liquid crystal display (LCD), is sure to

advance to more efficient and effective displays in response to consumer demand, and the present invention contemplates incorporation of new display technologies as they arise for the PIU display. Likewise, as keyboard standards change, the PIU's can be configured to incorporate such new keyboards.

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What is claimed is:

1. A pocket interface unit for a smart diskette, the smart diskette having a housing of the shape and size of a standard diskette, the smart diskette including electrical contacts, an activation switch, and an interface, a processor and memory disposed in the housing and operatively coupled to the electrical contacts, the pocket interface unit comprising:

a frame adapted to removably attach to the smart diskette housing;

electrical contacts, disposed on the frame, for engaging corresponding electrical contacts on the smart diskette;

switch operating means, disposed on the frame, for operating an activation switch on the smart diskette when the smart diskette is attached to the frame;

a display, disposed on the frame and operatively coupled to the electrical contacts, for displaying text and/or graphical data under control of the smart diskette; and

a plurality of user actuatable keys, operatively coupled to the electrical contacts, for facilitating user input of data under the control of the smart diskette;

wherein the pocket interface unit provides a user interface with the smart diskette.

2. The pocket interface unit according to claim 1, wherein the plurality of user actuatable keys comprise at least one of:

- a set of numeric keys;
- a set of function keys; and
- a set of cursor control keys.

3. The pocket interface unit according to claim 1, wherein the plurality of user actuatable keys comprise a mini-qwerty keyboard.

4. The pocket interface unit according to claim 1, wherein the display comprises one of:

- a touch-screen display; and
- a write on display.

5. The pocket interface unit according to claim 1, wherein the frame comprises:

- a first portion having a slot which removably engages the housing of the smart diskette; and

- a second portion, which is connected to the first portion of the frame by a hinge;

wherein the plurality of user actuatable keys are disposed on a surface of the first portion of the frame.

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6. The pocket interface unit according to claim 5, wherein the display is disposed on a surface of the second portion of the frame.

7. The pocket interface unit according to claim 5, wherein the display is disposed on the surface of the first portion of the frame adjacent to the plurality of user actuatable keys, one of said user actuatable keys being a power on/off switch for manually overriding the activation switch; and

wherein the second portion of the frame comprises a open and closeable cover for the display and plurality of user actuatable keys.

8. The pocket interface unit according to claim 1, further comprising means for communicating with at least one of a plurality of external devices, wherein the external devices are selected from the group consisting of:

- a cellular telephone network;
- an infra-red transmitting and/or receiving device;
- a short-range electro-magnetic wave receiver;
- a heart rate monitor;
- a cyclometer;
- a paging system;
- a PCMCIA device; and

a wired telephone network.

9. The pocket interface unit according to claim 1, further comprising a power source disposed in the frame, for providing power to the smart diskette through the electrical contacts when the smart diskette is attached to the frame.

10. The pocket interface unit according to claim 9, further comprising a magnetic transducer disposed on the frame for communicating with a corresponding magnetic transducer of a smart diskette when the smart diskette is attached to the frame.

11. A pocket interface unit for a smart diskette, the smart diskette having a housing of the shape and size of a standard diskette, the smart diskette including a magnetic transducer, an activation switch, and an interface, a processor and memory disposed in the housing and operatively coupled to the magnetic transducer, the pocket interface unit comprising:

a frame adapted to removably attach to the smart diskette housing;

a read/write head disposed on the frame, for communicating with the magnetic transducer on the smart diskette;

switch operating means, disposed on the frame, for operating an activation switch on the smart diskette when the smart diskette is attached to the frame; and

a display, disposed on the frame and operatively coupled to the read/write head, for displaying text and/or graphical data under control of the smart diskette;

wherein the pocket interface unit provides a user interface with the smart diskette.

12. A pocket interface unit according to claim 11, further comprising a plurality of user actuatable keys, operatively coupled to the read/write head, for facilitating user input of data under the control of the smart diskette.

13. A pocket interface unit according to claim 11, wherein the display comprises a touch-screen display for displaying text and/or graphical data under control of the smart diskette and inputting corresponding input data in response to a user touching predefined areas of the touch-screen display.

14. The pocket interface unit according to claim 12, further comprising a power source disposed in the frame, for providing power to the smart diskette through the electrical contacts when the smart diskette is attached to the frame;

wherein the plurality of user actuatable keys comprise at least one of:

- a set of numeric keys;
- a set of function keys; and
- a set of cursor control keys; and

wherein one of said user actuatable keys comprises a power on/off key for manually overriding the activation switch.

15. The pocket interface unit according to claim 12, wherein the plurality of user actuatable keys comprise a mini-qwerty keyboard.

16. The pocket interface unit according to claim 12, wherein the frame comprises:

- a first portion having a slot which removably engages the housing of the smart diskette; and

- a second portion, which is connected to the first portion of the frame by a hinge;

wherein the plurality of user actuatable keys are disposed on a surface of the first portion of the frame.

17. The pocket interface unit according to claim 16, wherein the display is disposed on a surface of the second portion of the frame;

wherein the display is disposed on the surface of the first portion of the frame adjacent to the plurality of user actuatable keys; and

wherein the second portion of the frame comprises a open and closeable cover for the display and plurality of user actuatable keys.

18. The pocket interface unit according to claim 11, wherein the smart diskette includes speech processing means for analyzing and/or synthesizing speech; and wherein the pocket interface unit further comprises:

at least one transducer for transducing electrical signals into audio signals, and/or for transducing audio signals into electrical signals under control of the speech processing means.

19. The pocket interface unit according to claim 11, further comprising means for communicating with at least one of a plurality of external devices, wherein the external devices are selected from the group consisting of:

- a cellular telephone network;
- an infra-red transmitting and/or receiving device;
- a short-range electro-magnetic wave receiver;
- a heart rate monitor;
- a cyclometer;

a paging system;
a PCMCIA device; and
a wired telephone network.

20. The pocket interface unit according to claim 11,
wherein the smart diskette includes means for accommodating
and interfacing with an insertable IC card.

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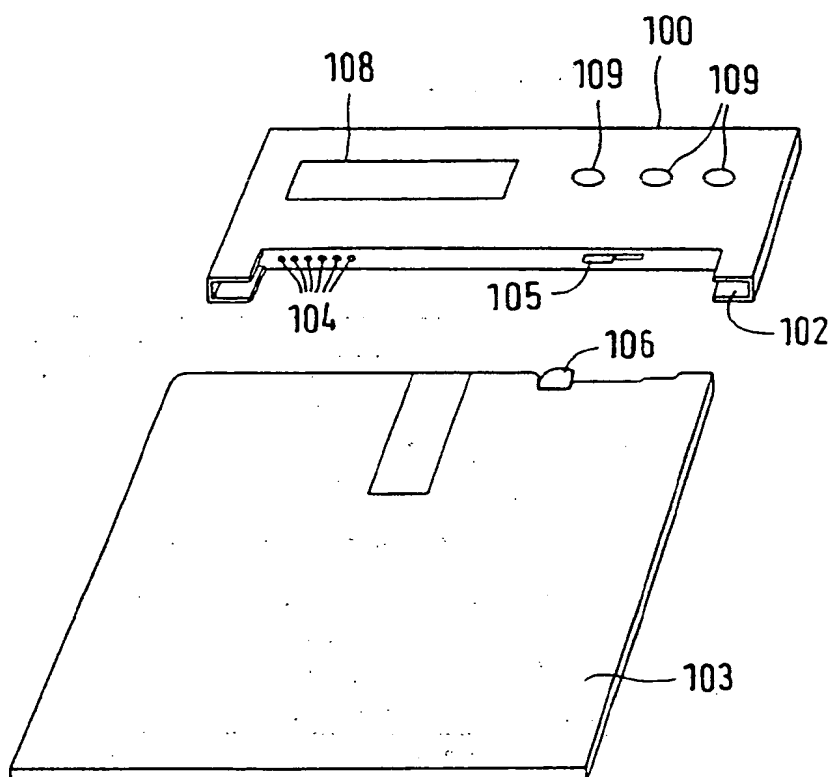
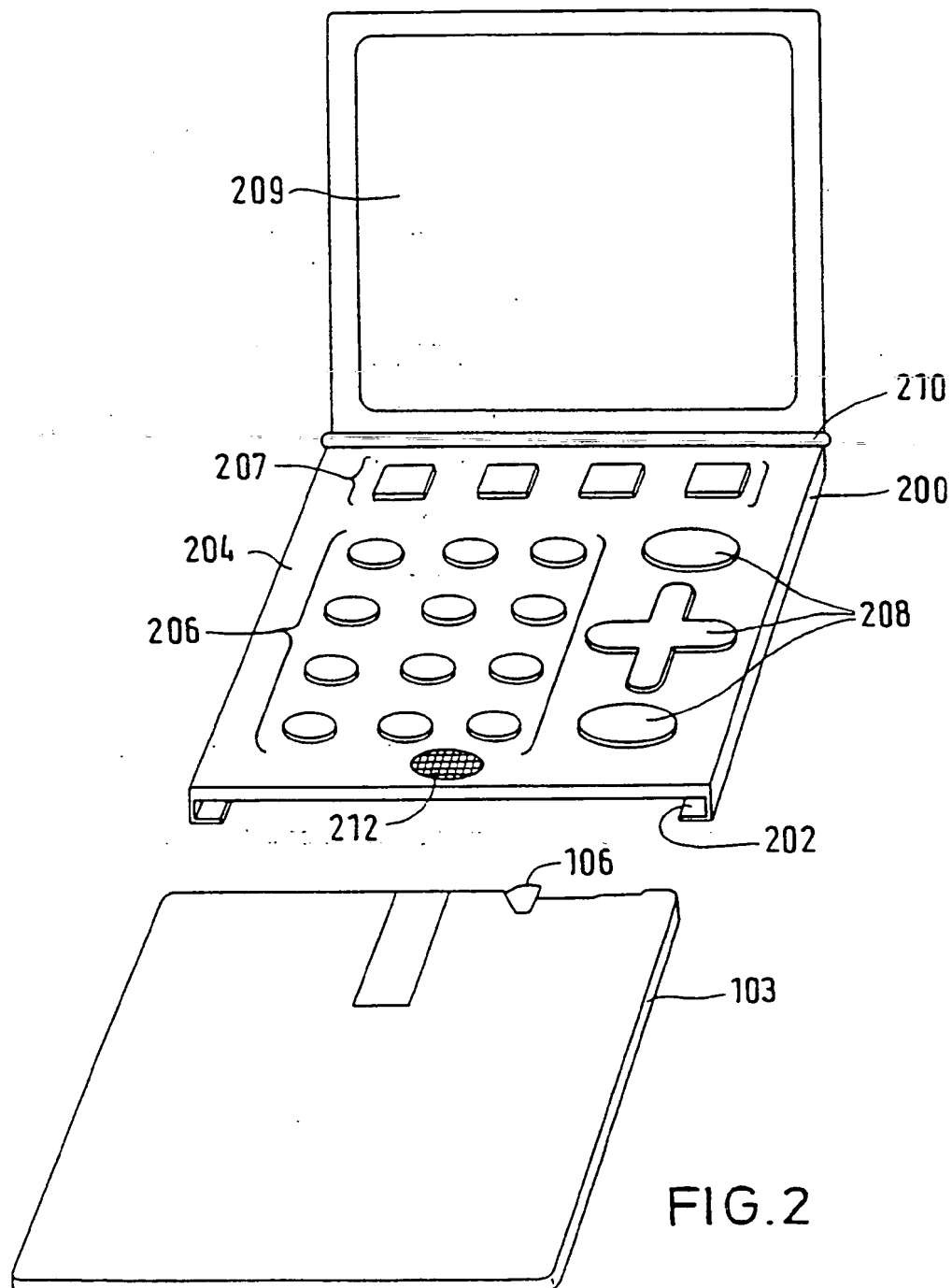


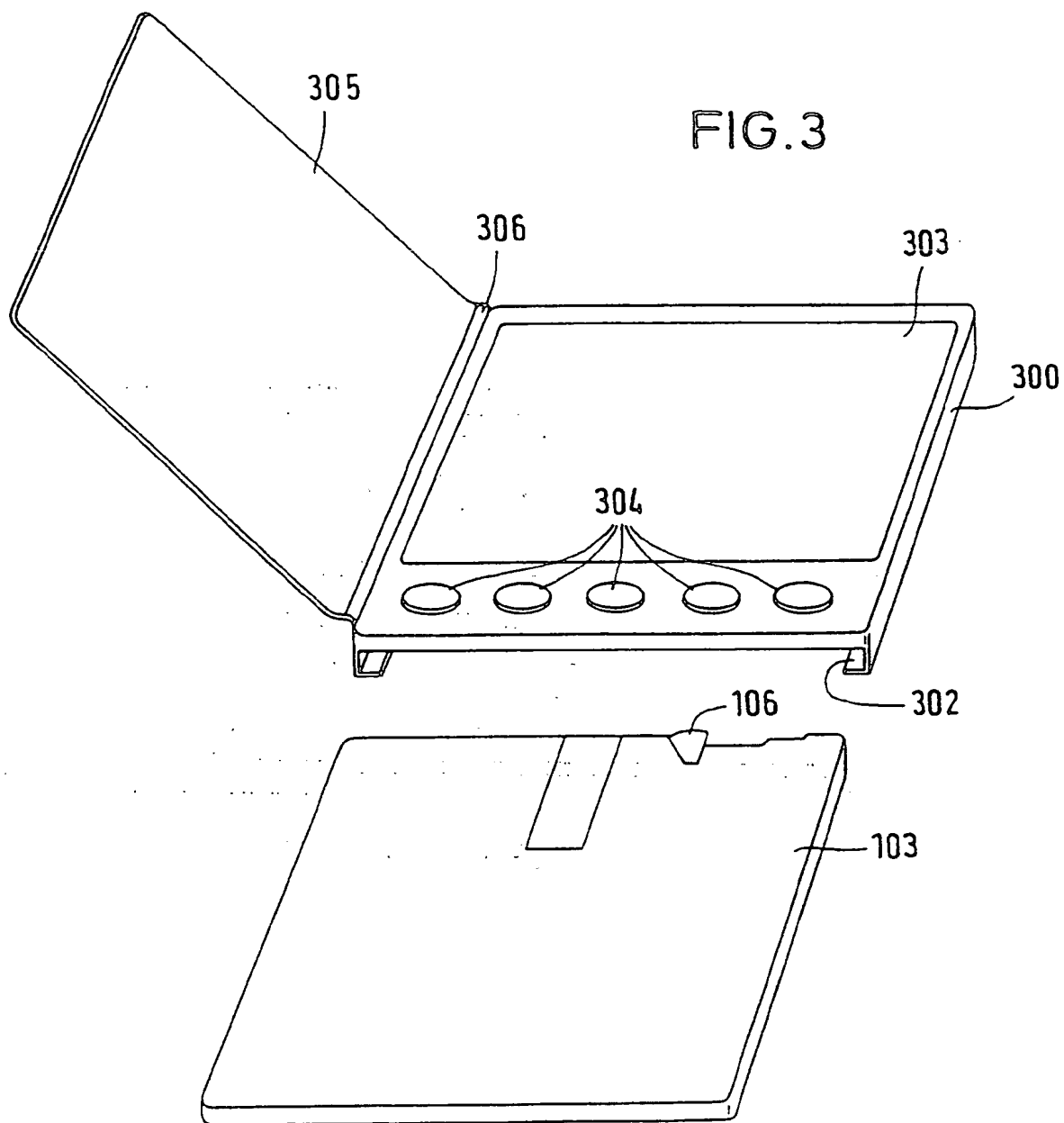
FIG.1

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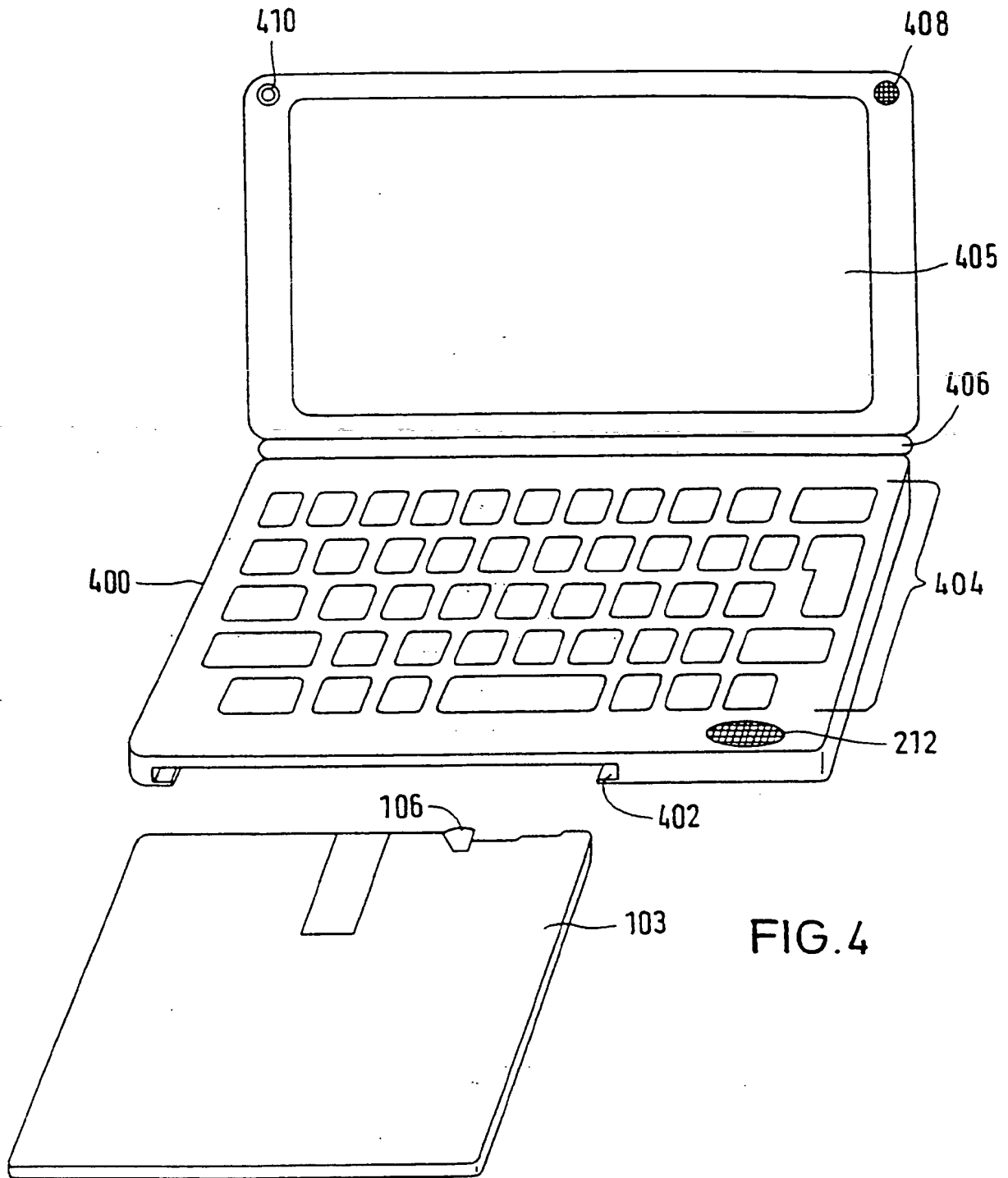
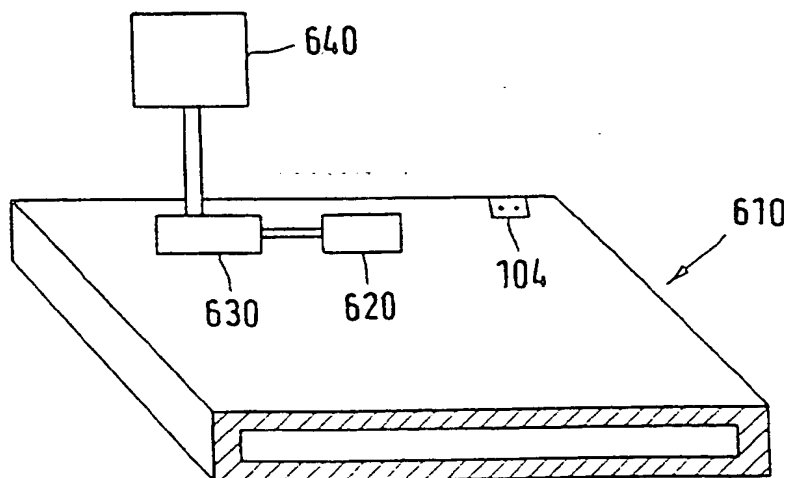
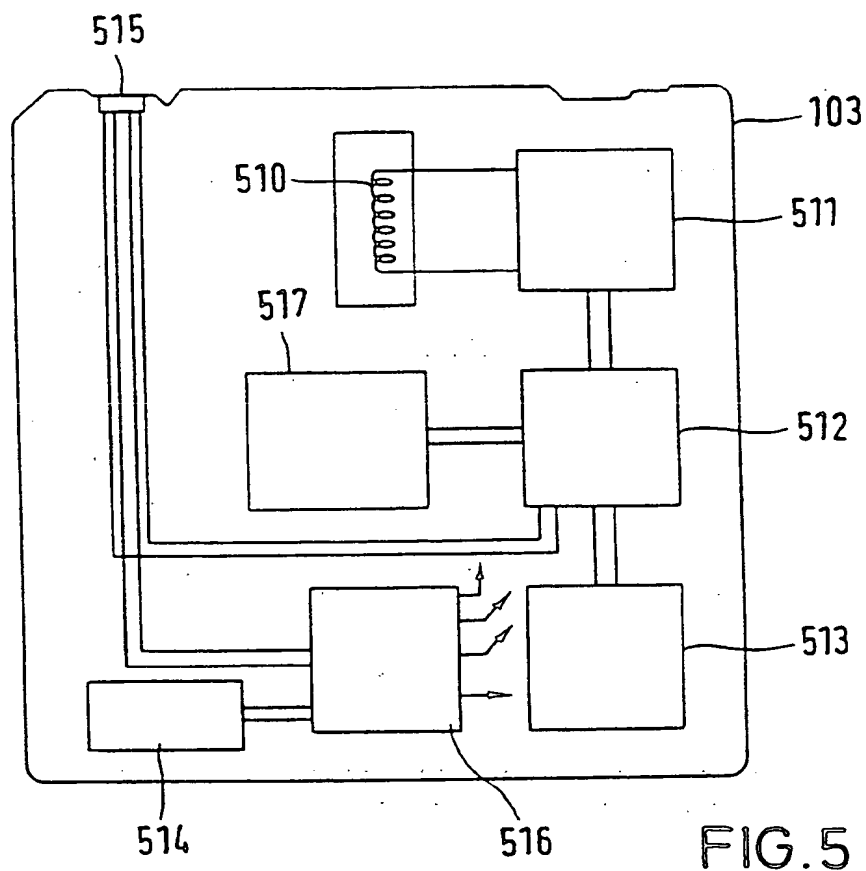


FIG. 4

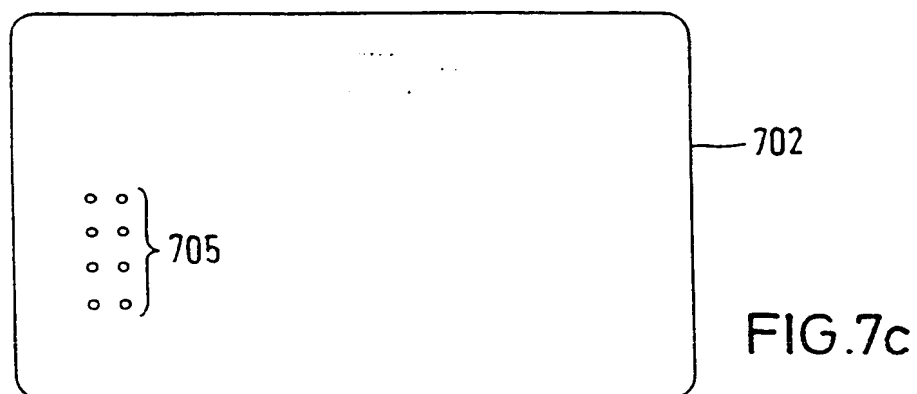
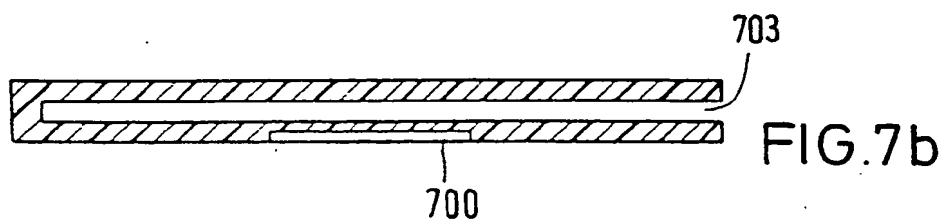
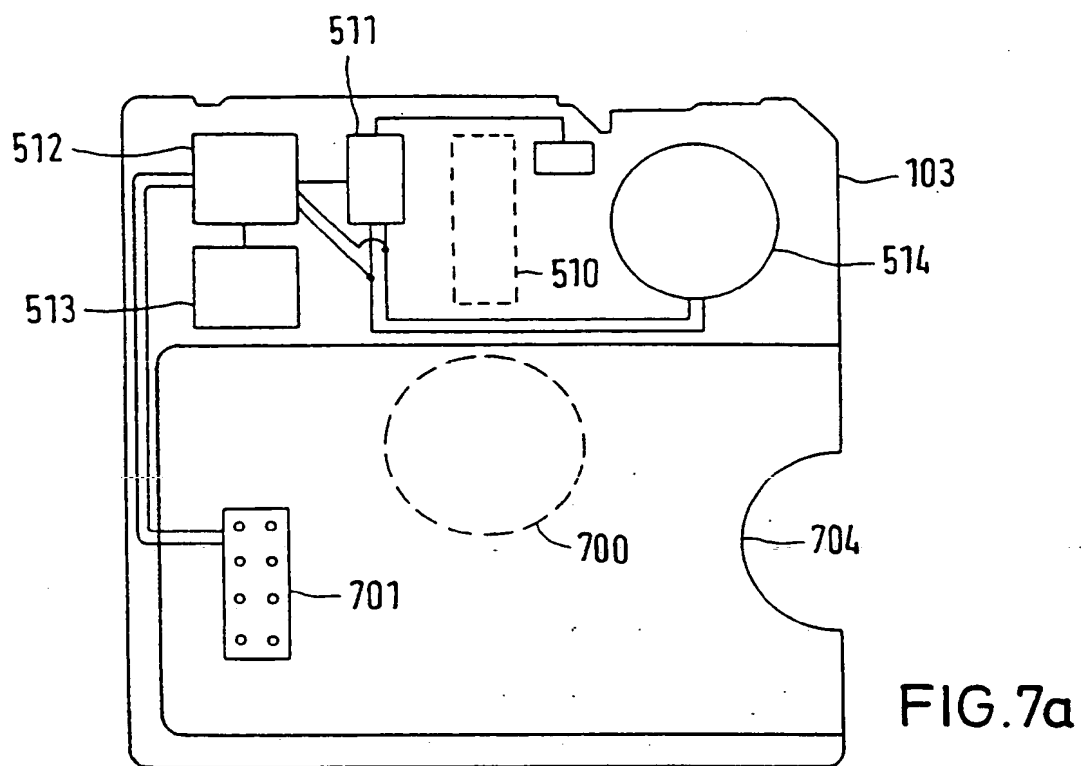
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INTERNATIONAL SEARCH REPORT

International Application No
PC1/EP 95/03745

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G06K19/077 G06K7/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,5 159 182 (EISELE,R.H.) 27 October 1992 cited in the application see claims 7-9 see figures 5,6	1,2,6, 9-12,14
A	GB,A,2 285 367 (MERWOOD LTD) 5 July 1995 see claims 1,4,5	8,20
A	EP,A,0 653 719 (ITT COMPOSANTS ET INSTRUMENTS) 17 May 1995 see claim 1	1,11
A	WO,A,93 07555 (SMARTDISKETTE GMBH) 15 April 1993 see the whole document	1-7,9-17
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

12 June 1996

Date of mailing of the international search report

19.06.96

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INTERNATIONAL SEARCH REPORT

Inter nal Application No
PC /EP 95/03745

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,93 00658 (SMARTDISKETTE GMBH) 7 January 1993 see claims 1,13 ---	1,11,20
A	EP,A,0 461 456 (SMARTDISKETTE GMBH) 18 December 1991 see claims 5,6,8 ---	1-4, 8-15,20
A	EP,A,0 542 524 (NCR INTERNATIONAL INC.) 19 May 1993 see figure 1 -----	2-4,6,7, 12-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC 1/EP 95/03745

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-5159182	27-10-92	DE-A- 3903454 CA-A- 2005150 EP-A- 0373411 JP-A- 2276081 JP-B- 7086912 DE-A- 4021199	13-06-90 12-06-90 20-06-90 09-11-90 20-09-95 19-12-91
GB-A-2285367	05-07-95	NONE	
EP-A-653719	17-05-95	FR-A- 2712414	19-05-95
WO-A-9307555	15-04-93	DE-C- 4133246 AU-B- 660494 AU-B- 2648392 CA-A- 2120762 EP-A- 0607203 JP-T- 7502350 US-A- 5471038	08-04-93 29-06-95 03-05-93 15-04-93 27-07-94 09-03-95 28-11-95
WO-A-9300658	07-01-93	DE-A- 4121023 AT-T- 126910 AU-B- 663092 AU-B- 1999892 CA-A- 2112246 EP-A- 0591295 ES-T- 2079194 JP-T- 6509194	07-01-93 15-09-95 28-09-95 25-01-93 07-01-93 13-04-94 01-01-96 13-10-94
EP-A-461456	18-12-91	DE-A- 4021199 AU-B- 644881 AU-B- 7830991 CA-A- 2044225 JP-A- 5127832 US-A- 5457590	19-12-91 23-12-93 18-03-93 12-12-91 25-05-93 10-10-95
EP-A-542524	19-05-93	US-A- 5233547 JP-A- 5242127	03-08-93 21-09-93